

REMARKS

Claims 1-21 are pending in the case. Further examination and reconsideration of pending claims 1-21 are hereby respectfully requested.

Objections to the Drawings

The Office Action states that “[f]igures 1 and 2 should be designated by a legend such as -- Prior Art-- because only that which is old is illustrated.” (Office Action -- page 2). In response thereto, Figs. 1 and 2 have been amended to include the legend “Related Art.” As such, the amendments to Figs. 1 and 2 do not present new matter. Accordingly, entrance of the amendments to the drawings and removal of the objections to the drawings are respectfully requested.

Section 112 Rejection

Claims 4-7 and 12-13 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverse this rejection.

In particular, the Office Action states that “[a]s to claims 4-7, these claims disclose simulating methods involving altering of p- and s-polarized light characteristics, but it is uncertain as to how these are altered.” (Office Action -- page 2). Therefore, it appears that the Examiner is equating the breadth of claims 4-7 with indefiniteness. However, the scope of the subject matter embraced by claims 4-7 is clear, and Applicants have not otherwise indicated that they intend the claimed invention to be of a scope different than that defined in claims 4-7. Therefore, although claims 4-7 do not specify how the p- and s-polarized light characteristics are altered, claims 4-7 are definite and clear. Breadth of a claim is not to be equated with indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the

claims comply with 35 U.S.C. 112, second paragraph. MPEP 2173.04. As such, although claims 4-7 do not specify how the p- and s-polarized light characteristics are altered, the breadth of claims 4-7 does not render these claims indefinite or unclear.

The Office Action also states:

As to claim 12, the claim discloses the limitation of ‘illuminating the reticle with light having polarization characteristics substantially equivalent to polarization characteristics of light projected onto the reticle by the exposure system.’ The light that illuminates the reticle and the light projected onto the reticle by the exposure system are the same light, it is uncertain as to how these two light beams are different. (Office Action -- page 3).

Claim 12 recites: “[t]he system of claim 1, wherein the optical subsystem is further configured to illuminate the reticle with light having polarization characteristics substantially equivalent to polarization characteristics of light projected onto the reticle by the exposure system.” Claim 1, from which claim 12 depends, recites in part: “[a] reticle inspection system, comprising an optical subsystem . . .”

According to claim 12, therefore, the optical subsystem included in the reticle inspection system is configured to illuminate a reticle with light, and an exposure system projects light onto the reticle. Obviously, light of an optical subsystem included in a reticle inspection system is not the same light projected onto the reticle by an exposure system since the reticle inspection system and the exposure system are two different systems. Therefore, the “two beams are different” in that an optical subsystem included in a reticle inspection system illuminates the reticle with “one beam,” and an exposure system projects “a different beam” onto the reticle. In other words, “the light that illuminates the reticle and the light projected onto the reticle by the exposure system” are not the same light. As such, claim 12 and claim 13 dependent therefrom are clear and definite.

For at least the reasons set forth above, claims 4-7 and 12-13 are definite because these claims particularly point out and distinctly claim the subject matter which applicant regards as the invention. Accordingly, removal of this rejection is respectfully requested.

Section 102 Rejection

Claims 1 and 2 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,665,052 to Sato (hereinafter “Sato”). Applicants respectfully traverse this rejection. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP § 2131. The cited art does not disclose all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not teach a reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system.

Independent claim 1 recites in part: “[a] reticle inspection system, comprising an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system.”

Sato discloses an illumination optical system and projection exposure apparatus. Sato, however, does not disclose a reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system. For example, Sato states that “This invention relates to an illumination optical system and, more particularly, to an illumination optical system suitably usable in an illumination optical device of a projection exposure apparatus for the manufacture of semiconductor devices, for example.” (Sato -- col. 1, lines 7-11). Sato also states that “FIG. 1 is a schematic view of a projection exposure apparatus having an illumination optical system according to a first embodiment of the present invention.” (Sato -- col. 6, lines 8-10). In addition, Sato states that “[d]enoted at 11 is a wafer (substrate) onto which the circuit pattern of the reticle 9 is to be projected and transferred thereby.” (Sato -- col. 6, lines 31-33). Therefore, Sato teaches a projection exposure apparatus. However, such a projection exposure apparatus is not a reticle inspection system. In addition, since the system of Sato is itself a projection exposure apparatus, such a system cannot simulate dose as a function

of position that would be projected into a resist by an exposure system. In other words, the projection exposure apparatus of Sato cannot simulate itself. In addition, Sato does not teach any system that can be used for reticle inspection. As such, Sato does not teach a reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system, as recited in claim 1. Therefore, Sato does not teach all limitations of claim 1.

For at least the aforementioned reasons, claim 1 and claims dependent therefrom are not anticipated by the cited art. Accordingly, removal of this rejection is respectfully requested.

Section 103 Rejections

Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato. Claim 14 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato in view of U.S. Patent No. 6,268,093 to Kenan et al. (hereinafter “Kenan”). Applicants respectfully traverse this rejection. To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F.2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). The cited art does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not teach or suggest a reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system, as recited in claim 1. For at least the reasons set forth above, Sato does not teach all limitations of claim 1. Sato also does not suggest all limitations of claim 1. In particular, Sato does not teach or suggest that the projection exposure apparatus taught by Sato can be configured for reticle inspection. In addition, Sato does not teach or suggest any reticle inspection system. Therefore, Sato does not teach or suggest a reticle inspection system that includes an optical subsystem

configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system, as recited in claim 1.

Kenan cannot be combined with Sato to overcome deficiencies in the teachings of Sato. For example, Kenan discloses a method for reticle inspection using aerial imaging. However, Kenan does not teach or suggest a reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system. In particular, Kenan states that “there is provided a method for inspecting a multiple die reticle that is used with an optical exposure system under a set of exposure conditions.” (Kenan -- col. 4, lines 43-45). Kenan also states that “[t]he optical system of the scanner module simulates the behavior of an optical exposure system and, as a result, the acquired transmission light aerial images are optically equivalent to those produced on the photoresist under a given set of exposure conditions.” (Kenan -- col. 5, lines 49-53). In addition, Kenan states that “[t]he radiation provided by the light source 3 preferably has the exact wavelength of the exposure system.” (Kenan -- col. 6, lines 39-41). Kenan further states that “[a]djusting the size and the shape of the illumination aperture 7 permits reproduction of the illumination and the coherence conditions of the photoresist exposure tool.” (Kenan -- col. 6, line 65 to col. 7, line 1). Furthermore, Kenan states that “[i]n the transmission light illumination mode, the different focus images of the reticle 1 are acquired with three CCD cameras 16-18 at different focal conditions.” (Kenan -- col. 9, lines 32-34).

Kenan, therefore, teaches an optical system that simulates the behavior of an optical exposure system by using light having a wavelength exactly that of the exposure system, adjusting the size and shape of an aperture to produce the illumination and coherence conditions of the exposure system, and acquiring images at different focal conditions. However, Kenan does not teach or suggest that the optical system is configured to simulate dose as a function of position that would be projected into a resist by the exposure system. In particular, the optical system of Kenan is not capable of altering dose as a function of position. In addition, Kenan does not suggest that the optical system of Kenan can be configured to alter dose as a function of position. For at least the reasons set forth above, therefore, Kenan does not teach or suggest a

reticle inspection system that includes an optical subsystem configured to produce an aerial image of a reticle by simulating dose as a function of position that would be projected into a resist by an exposure system, as recited in claim 1. As a result, Kenan does not teach or suggest all limitations of claim 1 and cannot be combined with Sato to overcome deficiencies contained therein.

For at least the reasons stated above, independent claim 1 and claims dependent therefrom, are patentably distinct over the cited art. Accordingly, removal of this rejection is respectfully requested.

Allowable Subject Matter

Claims 15-21 were allowed over the prior art. Claims 3 and 9-13 were objected to as being dependent upon a rejected base claim, but were deemed allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims; however, as discussed herein, Applicants believe the claims are allowable over the cited art in their present form.

CONCLUSION

This response constitutes a complete response to all issues raised in the Office Action mailed January 24, 2006. In view of the remarks presented herein, Applicants assert that pending claims 1-21 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned earnestly requests a telephone conference.

The Commissioner is authorized to charge any fees which may be required, or credit any overpayment, to deposit account number 50-3268/5589-04801.

Respectfully submitted,
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